SOURCE WATER ASSESSMENT PLAN

FOR

THE CITY OF PRETTY PRAIRIE

ADOPTED AUGUST 7, 2000

TABLE OF CONTENTS

1. SOURCE WATER PROTECTION AREA

The City of Pretty Prairie water source(s) are located at:

County:	Reno
Township:	26
Range:	6W
Section:	18
Well ID# or City Lake Name:	Well #5
Well Depth (in feet):	98
Capacity gpm if wells/Surface Acres if City Lake:	380 gpm
Status (in use/not in use/in development):	in use

County:	Reno
Township:	26
Range:	6W
Section:	18
Well ID# or City Lake Name:	Well #4
Well Depth (in feet):	80
Capacity gpm if wells/Surface Acres if City Lake:	300gpm
Status (in use/not in use/in development):	not in use, emergency backup to Well #5

County:	Reno
Township:	26
Range:	6W
Section:	18
Well ID# or City Lake Name:	Well #3
Well Depth (in feet):	64
Capacity gpm if wells/Surface Acres if City Lake:	300 gpm
Status (in use/not in use/in development):	not in use, (for emergency fire protection only)

(City Wells #1 and #2 have been plugged by the Equus Beds Groundwater Management District No.2)

The well log for Well #5 may be found in Appendix 1 of this document.

A map of the Source Water Protection Area(s) may be found in Appendix 1 of this document. The total protection area is approximately ~3 sq. miles.

The Source Water Protection Area(s) is based on a:

_____Wellhead Delineation--using a two-mile radius around the well.

_____ Watershed Delineation--using the surface drainage topography.

__X__ More rigorous delineation technique as described in Appendix 1. See Equus Beds Groundwater Management District No. 2 – Water-Resources Investigations Report 96-01: **Delineation of Wellhead Protection Areas for Public Water Supply Wells, City of Pretty Prairie, Kansas**

(See Appendix 4 for decision on rigorous delineation.)

2. POLLUTANT SOURCE INVENTORY

The pollutant source inventory was developed using the checklist found at Appendix 2 and drive-through surveys of the protection area. The survey and inventory was conducted by:

Surveyor's names:	Date
Bryce Hedrick	5-14-97
Michael Painter	5-14-97, 2-9-99
Marion Krehbiel	5-14-97, 2-9-99
Hans McDonald	5-14-97
Jerry McNamar	5-14-97
Mike Seyb	2-9-99
Scott Roberson	2-9-99

A general description of the protection area, with emphasis on the first 100-ft is as follows:

-Within 100 ft. of well #5 there is only cropland planted to wheat, and a gravel county road that receives a moderate amount of local traffic.

Since Wells #3 & #4 will not be placed back into service for drinking water use, they were not inventoried.

-Within the protection area 83 categories of potential pollutant sources were identified. The inventory sheets identifying the potential pollutant sources may be found in Appendix 2.
See map in Appendix 1. See inventory in Appendix 2.

A description of the City of Pretty Prairie and the surrounding areas may be found in Appendix 1 of this document in the Equus Beds Groundwater Management District No. 2 – Water-Resources Investigations Report 96-01: **Delineation of Wellhead Protection Areas for Public Water Supply Wells, City of Pretty Prairie, Kansas**.

3. WATER QUALITY PROTECTION MEASURES

The City of Pretty Prairie has identified measures to assure protection of the quality of the utilities' source of water. These Water Quality Protection Measures are described in Appendix 3 of this document.

4. SUSCEPTIBILITY ANALYSIS

The susceptibility analysis is a procedure for determining how the potential pollutant sources identified in the inventory pose a risk to the quality of the source water. Based on the recommendations of the Water Supply Protection Planning Committee, the most significant threats to the quality of the source water of the City of Pretty Prairie are summarized in the following list. The factors and methodology used to perform the susceptibility analysis may be found in Appendix 3. A complete list of the potential pollutant sources and their ranking according to risk may also be found in Appendix 3.

Significant potential threats to the quality of the source water of the City of Pretty Prairie, listed in order of greatest to least:

Potential Pollutant Sources

1. Abandoned Water Wells
2. Chemigation Systems
3. Tail Water Pit/Pond (irrigation/rainwater)
4. Ag. Center Fertilizer Sales
5. Ag. Center Pesticide Sales
6. Sewer Lines
7. Fuel Service Station
8. Ag. Center Fuel Sales

(Each source scored a 15 or above according to the Susceptibility Evaluation Table found in Appendix 3.)

A listing of other potential pollutant sources that may pose a risk can be found in Appendix 3.

Since Wells #3 & #4 will not be placed back into service for drinking water use, they were not included in the susceptibility analysis.

To summarize the results of the Susceptibility Analysis, the City of Pretty Prairie considers the overall risk to its water source to be: (circle the result)

Level of Risk

Low		Medium		High
1	2	(3)	4	5

Note: An overall risk level of "3" has been chosen since eight potential pollutant sources scored 15 or above, and an additional 30 sources scored between 11 and 14 in the susceptibility analysis. (A score between 11 and 19 indicates that a potential pollutant source category may pose a medium contamination risk.)

5. INFORM PUBLIC OF SOURCE WATER (WELLHEAD) PROTECTION PLAN

In accordance with the 1996 Safe Drinking Water Act Amendments the results of the Source Water Assessment portion of the City of Pretty Prairie Source Water Protection Plan have been made public. The Source Water Assessment requirements are--delineation of the protection area, an inventory of the potential contaminant sources, and a susceptibility analysis to determine the risk of contamination to the water source. The City of Pretty Prairie has provided this information to the public in the following manner:

Upon approval of the Source Water Assessment and Protection Plan a summary will be prepared and provided to the water systems patrons. This will be accomplished by incorporating it into the Consumer Confidence Report prepared each year by the City of Pretty Prairie. Notices will also be sent to landowners within the Wellhead Protection Area.

6. WATER QUALITY PROTECTION PLAN

The Water Quality Protection Plan describes the actions necessary to minimize the risk to the quality of the source water utilized by the City of Pretty Prairie.

1. The following actions will be taken to implement Water Quality Protection Measures:
   a. Abandoned water wells will be properly plugged. A goal of plugging 20% of the known abandoned water wells in the protection area each year has been set. It is hoped that after a five-year period all abandoned water wells will have been plugged.

   b. Due to nitrate concentrations higher than the maximum contaminant level (MCL), the City of Pretty Prairie will consider various means to sample the groundwater near Well #5. It is hoped that the specific source of the nitrates (if there is one) may be identified.

   c. The County Conservation District, County Extension Office, and Local Environmental Protection Program (county sanitarian) will be contacted and informed of the location of the City of Pretty Prairie Source Water (Wellhead) Protection Area and the development of a Source Water Assessment and Protection Plan.

   d. After consultation with a local Certified Crop Advisor, it has been determined that almost all of the farmers within the Source Water (Wellhead) Protection Area routinely have soil tests done before application of fertilizer. The County Conservation District, County Extension Office, and local Certified Crop Advisors have been instrumental in providing information concerning soil and crop management. They will be asked to continue to provide assistance and encouragement concerning continued use of annual soil testing within the Pretty Prairie Source Water (Wellhead) Protection Area.

   e. It has been determined that the local Ag. Service Centers provide fertilizer and pesticide application services for the majority of the farmers in the area. It is also recognized that the local Ag. Service Centers and farmers have implemented a number of Protection Measures in relation to Fuel, Fertilizer, and Pesticide use to comply with State and Federal Regulations. Continued compliance with these regulations and continued vigilance concerning pollution prevention will be encouraged.

   f. The County Conservation District will be asked to assist with public education concerning water quality protection within the Source Water Protection Area. They will also be asked to provide information concerning the availability of financial resources for reduction of non-point source pollution. The County Extension Agent will be asked to provide information to residents and landowners concerning soil testing, the Farm-A-Syst/Home-A-Syst program, and the proper use of lawn and garden chemicals.

6. Source Water Protection Plan (cont.)

2. The following actions will be taken to assure continued maintenance of Water Quality Protection Measures presently in place:
    a. Water wells abandoned in the future will be properly plugged.

    b. Efforts will be made to maintain good communication with Ag. Service Center owners, farmers and landowners within the protection area, providing beneficial information concerning recommended Water Quality Protection Measures.

    c. The Ag. Service Centers will be asked to educate and remind their employees of the need to follow the Recommended Water Quality Protection Measures.

    d. Signs will be placed along the paved county roads where they enter the Source Water (Wellhead) Protection Area, providing emergency response contact information in the event of a spill.

    e. Each year the Source Water Assessment and Protection Plan will be re-evaluated. (About the same time of the year that the water systems Consumer Confidence Reports are due.) At this time progress towards plugging the abandoned water wells in the protection area will be evaluated. If any new potential pollutant sources are identified, the potential risk they may pose to our wells will be evaluated and the plan revised to reflect the change.

    f. Each year, when the Consumer Confidence Reports are due, the County Conservation District, and County Agent will be asked to assist with public education concerning water quality protection within the Source Water Protection Area.

    g. Water Analytical reports will be evaluated to make sure there is not an increase in any inorganic or organic substances that could cause a problem.

3. The following actions will be taken to assure that future potential pollutant sources are aware of the expectations/requirements of the City of Pretty Prairie Source Water (Wellhead) Protection Plan:
    a. Efforts will be made to stay alert to any future activities that could potentially effect the water quality of our wells.

    b. Efforts will be made to educate new landowners concerning the recommended Water Quality Protection Measures when the Consumer Confidence reports are prepared each year. The County Conservation District, and County Extension Office will be asked to assist.

2000

Water Emergency Operations Plan

THE CITY OF PRETTY PRAIRIE EMERGENCY WATER SUPPLY PLAN

Pursuant to the requirements of K.A.R. 28-15-18 the City of Pretty Prairie has compiled the following information, guidelines, and ordinance for the purpose of originating an Emergency Water Supply Plan.

Adopted 02/20/95

ADOPTED 02-20-95

SECTION I. PURPOSE

To isolate and conserve an adequate supply of potable water during emergency conditions that will be used only to sustain human life and the lives of pets and maintain standards of hygiene and sanitation.

SECTION II. DESCRIPTION

The potable water supply for the City of Pretty Prairie is obtained from Well #5 that went on line November 1, 1994. Well #5 is located at 23001 Whiteside Rd. The potable water from this well is transported by pipeline from the well site to the water tower site at the intersection of Santa Fe Avenue and Booth Street. The water is chlorine treated for bacteria at this site by a gas chlorination system that was installed February of 1995. Well #5 can produce approximately 350 gallons of water per minute at 252' TDH. A peerless submersible turbine, 30 HP, 230V, 3 phase pump was installed at time of construction. The pipeline assembly consists of six inch Cl 160 PVC pipeline with gasket joints installed in a trench with a minimum of a 42 inch cover. The pipeline route extends west from the site of Well #5 to a point east of the railroad tracks, thence south to a point approximately 100 feet north of Main Street, then west and through a 10 " casement under the railroad right of way, then south through an encasement under Main Street, then south to connect to the existing discharge assembly of the water tower well. There is approximately 4,400 linear feet of pipeline and 220 linear feet of encasement. A six inch flow meter, flow switch for chlorinator interlock as necessary has been installed to meter water production from the new well and start the chlorinator when the Well #5 is pumping. The City has also retained rights to Well #3 and Well #4. The City maintains a 50,000 gallon above-ground storage facility. The original system consisted of primarily 6 inch, 4 inch and some 2 inch lines. Additional lines have been constructed as the City has grown. Those newly constructed lines are pvc materials.

SECTION III. DISASTER ORGANIZATION--CHAIN OF COMMAND AND DEPARTMENTAL RESPONSIBILITIES.

A. Mayor--In charge overall

1. Mayor shall establish communication within governing body, local news media, and general public.

a. The Mayor may declare a state of emergency and excercise emergency powers upon making the declaration. Emergency powers may continue until the Mayor delcares that an emergency no longer exists.

b. This action is authorized by K.S.A. 48-932 et. seq.
c. Mayor shall determine the necessity of meeting with the City Council if a state of emergency exists.

2. Mayor shall coordinate efforts of city work force in the repairs of damaged infra-structure.
a. City Council shall assist in assessing damages to infra-structure and determing if additional work force is needed.
b. The governing body and City Maintenance Superintendent shall work closely with the City Office/Clerk to assess financial responsibilities.

3. The Mayor and City Council shall establish and locate command posts, medical posts, shelters, traffic control, etc., while working with guidance from the following:
a. Reno County Emergency Preparedness Personnel
b. Reno Kingman County Joint Fire Dist. #1
c. Pretty Prairie Ambulance Service

B. City Superintendent of Public Works or Assistant

1. The City Superintendent shall assess damages and establish communications with Mayor and Council.

2. Upon direction from the Mayor, the City Clerk shall notify KDHE District Engineer, or Bureau of Water Supply, and request assistance if determined to be necessary.

3. The City Superintendent shall determine any needed repairs or alternations from the wells to the treatment plant and throughout the distribution system.
a. The City Superintendent shall report these repairs to the Mayor, City Council/and or command post.

4. The City Superintendent will request emergency equipment/supplies if needed.
5. The City Superintendent will request work force assistance from the Mayor and Council if needed.
6. The City Office/Clerk will contact power companies as to any loss of power.

Adpt. 2-20-95
Amd. 4-3-95

7. The City Superintendent shall be responsible for electrical generator power at Well #4 in the event of a long-term power outage. Well #4 is currently being maintained as an emergency back-up well in the event of power failure. The City Supt.shall monitor the level of water in the tower. In the event the pressure falls below 42 psi, the emergency generator will be started up to operate Well #4. It shall be noted that Well #4 is our back up well and at present has a higher nitrate level and steps should be taken to get Well #5 back in operation as soon as possible after power is restored. The City has contracted with Joe Kaufman for the use of his tractor to run the generator in case of an emergency.
8. City Office/Clerk shall contact electricians from Hirst and Son Supply or other contractors to restore electrical power at wells upon direction from Mayor.
9. Command post shall coordinate with City Office personnel, the acquisition of supplies or materials and list the incoming emergency equipment or supplies.
   a. The City Office/Clerk shall keep an inventory of rented/leased/borrowed emergency equipment.
   b. The City Office/Clerk along with the command post shall coordinate volunteer organizations and their efforts.

SECTION IV. MUTUAL AID AGREEMENT

A. A cooperative arrangement for water supply replenishing with Reno County Emergency Preparedness personnel will exist. Their office will assist the City in supplying potable water until our system is safely on line again.

SECTION V. INVENTORY OF EMERGENCY EQUIPMENT AVAILABLE

A. City owned equipment
   1. Electric generator (tractor powered) for Wells #4 and #5 to operate pump(s) and chlorination equipment.
   2. Cutting torch (portable) & welder (stationary)
   3. Construction equipment including backhoe, grader, dump trucks, etc.
   4. Cast iron and pvc pipe fittings located at City Maintenance Shed

B. Locally owned equipment and supplies.
   1. Hirst and Son Supply--qualified electricians and plumbers that have contracted with the City on numerous occasions.
   2. F&S, Inc.--fabrication business that will give the City access to welding trucks, trailers, and other equipment. F&S has done repair on the system's tower and sewer treatment plant.

3. Larry Siebert--
   a. Bulk water hauling (non-potable water)
4. Sid Strohl--
   a. Bulk water hauling (non-potable water)
5. Riley Krehbiel--
   a. Bulk water hauling (non-potable water)
6. Clarke Well and Equipment--Great Bend, KS
7. Central Service, McPherson, Kansas
   a. PVC piping and connections for temporary piping
8. Reno-Kingman Joint Fire District No. 1
   a. Our area fire fighters have their own floating pump that the City could have access to should the situation call for one.

C. Equipment available through the State of Kansas.

1. Chlorinators (Through KDHE)

2. Federally owned units such as portable filter plants, portable storage tanks, etc. (through Bureau of Water Supply) and the National Guard.

3. The City Office/Clerk will assist Command Post and City Maintenance Supervisor in attaining the needed equipment, contractors and work force as needed.

SECTION VI. VULNERABILITY OF SYSTEM (DISASTER RESPONSES)

A. Drought--As determined by the City Maintenance Supervisor with authority given in Ordinance No. 178.

1. City Ordinance No. 178 will go into effect regulating the non-essential use of water during an emergency upon authorization from the City Maintenance Supervisor.

2. Upon direction from the Command Post, the City Office/Clerk will attempt to obtain water from Reno Co. Emergency Preparedness and FEMA.

B. Accidental Spills or Contamination
1. Maintenance Supervisor or City Office/ Clerk shall contact 911.

2. City Maintenance Supervisor shall assess situation and upon Mayor's approval, the City Office/Clerk shall notify KDHE, Regional EPA Office or Office of Emergency Preparedness of extent of damages.

3. The City Office/Clerk shall establish communications with Reno County Sheriff's office, fire, news media and general public upon direction from Mayor.

4. If necessary, the City Maintenance Superintendent shall encact City Ordinance No. 178 that will prohibit non-essential use of water during an emergency.

5. The City Maintenance Supervisor shall make sure that all sources of uncontaminated raw water and potable water storages are full.

6. When or if hazardous substances contaminate the water supply at the well location, the City Maintenance Supervisor shall stop all raw water from being pumped.

7. The City Maintenance Supervisor shall utilize 50, 000 gallon overhead storage tank supply.

8. Upon direction of Mayor/City Council, the City Office, Clerk shall purchase bottled water for consumption.

9. The command post will assign a work force to transport water into the City from another source, such as the City of Kingman.

C. Treatment Plant
1. Power outage due to natural or man-made disaster.
a. City Maintenance Supervisor will utilize city generator and restore electricity to high service pumps.
b. The City Office/Clerk will ascertain from KG&E when the power will be restored.

2. Excessive damage to Water Treatment Plant by storm, explosion, etc.
a. City Maintenance Supervisor will assess damages and City Office/Clerk will establish communication through the City Office with news media and general public.

b. City Maintenance Supervisor will place Ordinance No. 178 into action and will prohibit the non-essential use of water during an emergency.

c. Upon direction of the Mayor/City Council, the City Office/Clerk will notify KDHE & Bureau of Water Supply of any anticipated needs.

d. City Maintenance Supervisor will isolate distribution system and utilize water storages.

e. If necessary, the command post will authorize a city work force to repair damages to bring plant back on line.

D. Distribution System

1. Damage to water mains
   a. City Maintenance Superintendent will authorize enforcement of Ordinance No. 178 for non-essential use of water.

   b. City Maintenance Superintendent and crew will isolate mains and repairs.

2. Storage tank damage
   a. City Maintenance Superintendent will enact Ordinance No. 178 for non-essential water use.

   b. City Maintenance Superintendent will isolate the storage tank by closing valves at the base of the tower or tank.

E. Terrorist threats

1. Notify City Clerk's office of threat and coordinate civil defense personnel to provide guard protection at the wells, treatment plant and storage tank.

F. Radioactive fallout

1. The City Clerk will contact Office of Emergency Preparedness for information as to the possibilities of contamination to the system.

2. The City Maintenance Supervisor will enact Ordinance No. 178 for non-essential use of water in an emergency situation.

3. The City Maintenance Supervisor will utilize stored water until plant can be placed on line again.

SECTION VII. WATER RATIONING ORDINANCE--ADDENDUM #1

A. Refer to City Ordinance No. 178.

ADOPTED 02-20-95

SECTION VIII, LIST OF KEY PERSONNEL, SUPPLIER, KDHE, BUREAU OF WATER SUPPLY, REGIONAL EPA OFFICE, OFFICE OF EMERGENCY MANAGEMENT.

AS FOLLOWS: LOCAL/COUNTY/STATE--CHAIN OF COMMAND AND CONTACTS, CURRENT NAMES ADDRESSES, AND TELEPHONE NUMBERS

CITY OF PRETTY PRAIRIE/ADMINISTRATION
119 W. Main
Pretty Prairie, KS 67570-0068
(316) 459-6392

OFFICE OF THE MAYOR:
Curt Miller, Mayor
23708 S. Dean Rd.
Pretty Prairie, KS 67570
Home Phone 316-459-6693

OFFICE OF THE CITY CLERK
Patti Brace, City Clerk
310 S. Elm
Pretty Prairie, KS 67570
Home Phone 316-459-6886
Office Phone 316-459-6392

CITY MAINTENANCE SUPERVISOR/SUPERINTENDENT
David Brooner
409 E. Main
Pretty Prairie, KS 67570
Home Phone 316-459-6541
Office Phone 316-459-6201

DEPUTY CITY CLERK
Nancy Royer
202 S. Plum
Pretty Prairie, KS 67570
Home Phone 316-459-6499
Office Phone 316-459-6392

SENIOR CITY COUNCIL MEMBERS
Buck Wiard
311 N. Park St.
Pretty Prairie, KS 67570
Home Phone 316-459-7285

Bill Doll, Councilmember
125 S. Park
Pretty Prairie, KS 67570
316-459-6411

FIRE CHIEF
Robert Seefeldt, Fire Chief
326 S. Collingwood
Pretty Prairie, KS 67570
Home Phone 316-459-6606
Office Phone 316-459-6404

LOCAL ELECTRICIAN AND PLUMBER
Hirst & Son Supply
201 W. Main
Pretty Prairie, KS 67570
Home Phone 316-459-6981
Business Phone 316-459-6521

LOCAL ELECTRIC AND GAS UTILITY
Kansas Gas and Electric
PO Box 208
Wichita, Kansas 67201
Business Phone 316-264-1141
1-800-794-6101

CABLE TELEVISION COMPANY
Classic Cable
PO Box 429
Plainville, Kansas 67663
1-800-999-8876

RENO COUNTY EMERGENCY MANAGEMENT
210 W. 1st
Hutchinson, KS 67501
Office 316-694-2974

KANSAS DEPT. OF HEALTH AND ENVIRONMENT
Bureau of Water
130 S. Market, 6th Floor, Rm. 6050
Wichita, Kansas 67202
316-337-6020

BUREAU OF WATER SUPPLY
Topeka, Kansas
913-296-1500

OFFICE OF EMERGENCY MANAGEMENT
Division of Emergency Preparedness of Kansas
2800 Topeka Blvd.
Topeka, Kansas 66601-0300
24 Hour 913-296-3176
913-274-1436 Contact: Marvin Henry

FEDERAL EMERGENCY MANAGEMENT AGENCY
Region VII
911 Walnut Street, Room 200
Kansas City, MO 64106
816-283-7002

THIS LIST WILL BE UPDATED ANNUALLY WHEN POLICY IS REVIEWED IN FEBRUARY OF EACH YEAR.

ANNUAL REVIEW SIGN OFF SHEET--
IT SHALL BE REQUIRED THAT THIS POLICY SHALL BE REVIEWED ANNUALLY BY THE GOVERNING BODY OF THE CITY OF PRETTY PRAIRIE, CITY MAINTENANCE SUPERVISOR, PRETTY PRAIRIE AMBULANCE SERVICE, AND RENO-KINGMAN COUNTY JOINT FIRE DISTRICT NO. 1, AND ATTESTED TO BY THE CITY CLERK.

DATE REVIEWED	SIGNATURE
2/20/95	Roger L. McClure
4/3/96	Roger L. McClure
3/4/97	Roger L. McClure
3/2/98	Curt Miller
2/18/00	Curt Miller

LIST OF EFFECTIVE PAGES--

PAGE NUMBER	CURRENT ISSUE
PAGE 1	02-20-95
PAGE 2	02-20-95
PAGE 3 AMENDED	02-20-95 04-03-95
PAGE 4	02-20-95
PAGE 5	02-20-95
PAGE 6	02-20-95
PAGE 7	02-20-95
PAGE 8	02-20-95 03-03-97 03-02-98
PAGE 9	02-20-95 03-02-98
PAGE 10	02-20-95
PAGE 11	02-20-95
ADDENDUM #1	02-20-95

ORDINANCE NO. 178

AN ORDINANCE PROVIDING FOR THE PROHIBITED NON-ESSENTIAL USE OF WATER DURING AN EMERGENCY, AND PROVIDING FOR PENALTIES FOR VIOLATION THEREOF.

BE IT ORDAINED BY THE GOVERNING BODY OF THE CITY OF PRETTY PRAIRIE:

Section 1. Whenever the City Maintenance Supervisor shall deem that an emergency exists by reason of a shortage of water supply or inadequate water pressure, and it is necessary in order to properly protect and fully to utilize the supply of water for essential uses such as fire protection, household consumption, maintenance of health and sanitation facilities and the operation of essential business, the City Maintenance Supervisor shall have power to declare an emergency to exist, and the City Council shall have the power to prohibit during the period of emergency the use of water from the City water supply for essential cases only. Such emergencies shall be deemed to continue until it is declared by the City Maintenance Supervisor, upon consulting with the City Council, to be ended.

Section 2. For the purposes mentioned in Section 1, the City Maintenance Supervisor may prohibit or restrict any of the following uses of water from the City water supply:

a. The sprinkling of watering of shrubbery, trees or grass through the use of a hose or otherwise; provided, that nurseries shall be allowed to use a minimum amount of water to keep their present stock, shrubbery or trees alive.

b. The washing of automobiles, trucks, or any other type of mobile equipment.

c. The washing of sidewalks, porches, filling station aprons, or floors and interiors of buildings or trucks; provided, that the City Maintenance Supervisor may permit the reasonable use of water to maintain sanitation and may permit the reasonable use of water for, the washing of filling station aprons and floors essential to public safety and the prevention of fire hazards.

d. Air conditioning or evaporative cooling systems designed and used to reduce room temperature for the comfort of persons using such room except in hospitals and nursing homes.

e. The use of water in fountains, wading pools, swimming pools, fish ponds, golf courses or any recreational grounds.

Section 3. The governing body may make such other limitations, restrictions, prohibitions, or variances upon the use of such water as it deems necessary to make the exigencies of the emergency.

Section 4. Violations of the limitations, restrictions or prohibitions imposed by Sections 1 and 2 shall be considered to be violations of the same nature as violations of any ordinance of the City and shall be punishable the same as in any other ordinance violation.

This ordinance shall be in full force and effect from and after its publication once in the official city newspaper.

PASSED AND APPROVED by the Governing Body this 16th day of December, 1991.

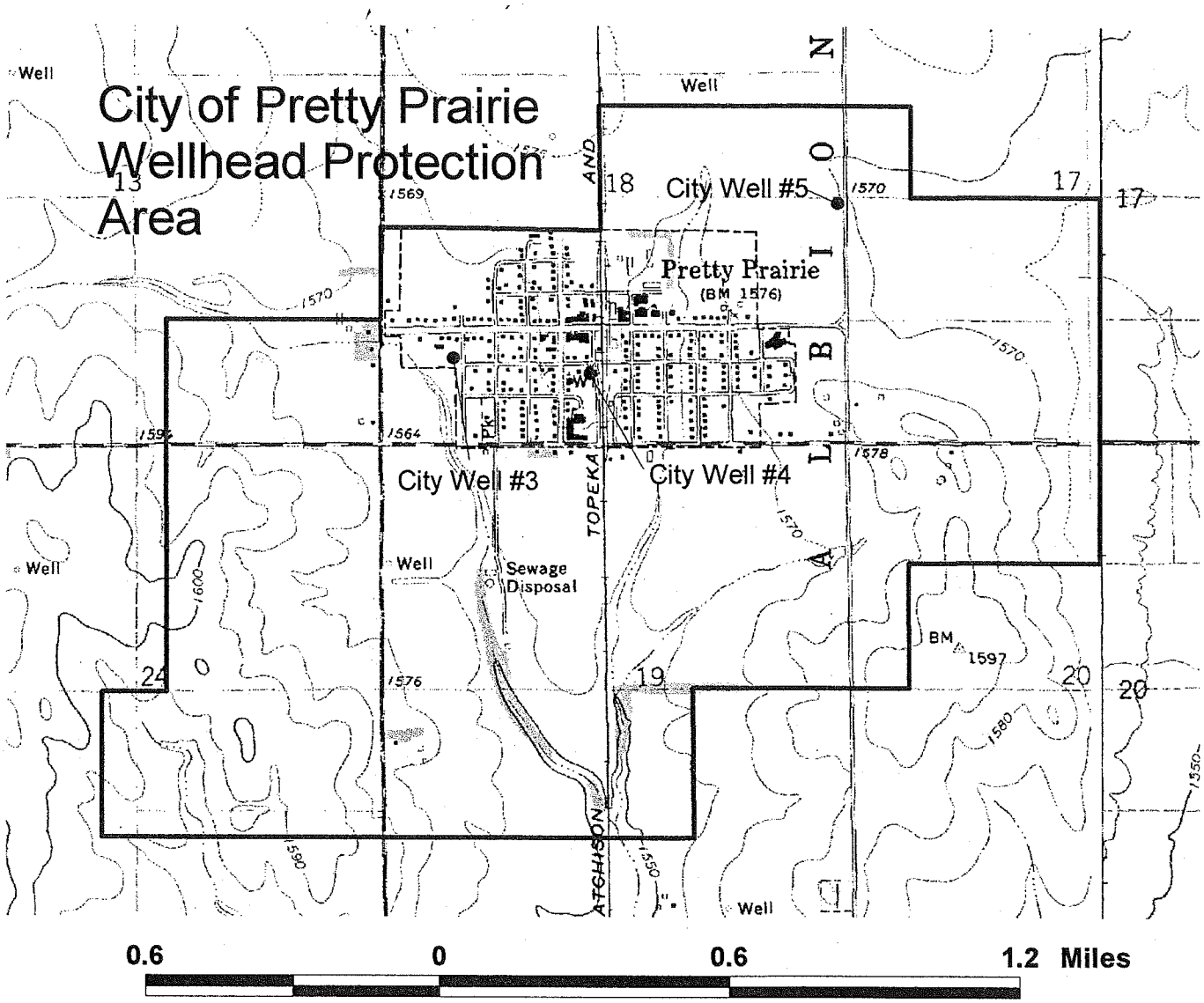
_____
Mayor

ATTEST:

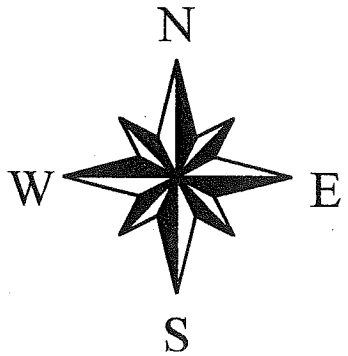
_____
City Clerk

Appendix - 1. Map of Source Water (Wellhead) Protection Area and Logs of Wells

City of Pretty Prairie



Delineation of Protection Area based on 3-year Capture Zone



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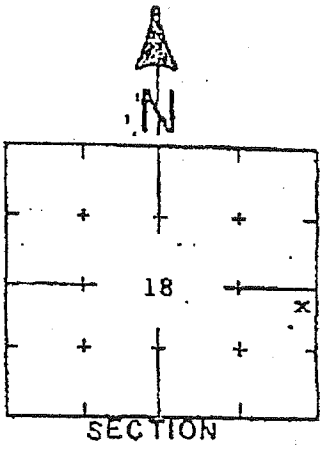
City wells.shp

CLARKE WELL & EQUIPMENT, INC.

WELL RECORD
DESIGN & CONSTRUCTION SHEET



JOB NUMBER 2498

WELL OWNER Pretty Prairie, City of WELL NO. 5

WELL USE Public Water Supply APPROPRIATION NO. 41,464

LOCATION NE 1/4 NE 1/4 SE 1/4, SECTION NO. 18

T 26 S, R 6 W/E Reno COUNTY Kansas
State

2540 FSL, 100 FEL

SIZE HOLE 30 "DIA.

SIZE CASING 12 3/4" DIA. .375 WALL; WT. 49.56 LBS/FT Steel MATERIAL
#304 stainless

SIZE SCREEN 12 3/4" DIA. WALL steel MATERIAL .070 Continuous SLOT/~~XXXXX~~

FORMATION LOG. From last no.			Formation Thickness
from	to		
0	3	Topsoil	
3	7	Clay	
7	20	Sand and gravel, some clay,	
		sandy	
20	34	Sand and gravel, fine, medium	
34	39	Sand and gravel with clay streaks	
39	62	Sand and gravel, fine, medium	
62	66	Fine sand, thin layers yellow	
		clay, gravel, one strip gray	
		clay approximately 2" thick,	
		soft and sticky, interval	
		approximately 50% clay, sand in	
		intermittent layers	
66	97	Sand and gravel, fine, medium,	
		yellow clay streak at 73'	
97	98	Shale, red	

FROM GROUND LEVEL	FROM	TO	FIC
Casing	0	76.25	76.25
Screen	76.25	97.90	21.65
CASING LEFT ABOVE GROUND			1.80
TOTAL CASING AND SCREEN			99.70

STATIC WATER LEVEL 27' From ground level CHLORINATE 30 gallons QUANITY USED 10% sodium hypochlorite

GRAVEL PACK
71 TO 98
TO

ANNULAR SEAL
0 TO 5 Topsoil
5 TO 56 Concrete grout
56 TO 71 Bentonite Holeplug

WHAT IS THE NEAREST SOURCE OF POSSIBLE CONTAMINATION None known

DIRECTION FROM WELL HOW MANY FEET

DESIGNED BY DRILLED BY Mark Esfeld DATE 10-11-94

Delineation of Wellhead Protection Areas for Public Water Supply Wells, City of Pretty Prairie, Kansas

Equus Beds Groundwater Management District No. 2
Water-Resources Investigations Report 96-01

Prepared in cooperation with the
City of Pretty Prairie, Reno County Health Department and the Kansas Department of Health and Environment

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Halstead, Kansas
1996

CONTENTS

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By
M.T. Dealy

INTRODUCTION

The City of Pretty Prairie in cooperation with the Reno County Health Department, Kansas Department of Health and Environment (KDHE) and the U.S. Environmental Protection Agency (EPA) seek to develop a Wellhead Protection Program (WPP) for its public water supply wells.

The purpose of the WPP is to protect the quality of the Equus Beds aquifer in and around the City's public water supply wells and address excessive nitrate concentrations detected by the City in its supply wells.

Seven basic elements of a WPP contained in the Kansas Wellhead Protection Program, as approved by EPA are:

1. Specify the duties of state agencies, local governmental entities and public water supply systems with respect to development and implementation of programs;
2. For each wellhead, determine the Wellhead Protection Area (WPA) based on all reasonably available hydrogeologic information on groundwater flow, recharge and discharge, and other information the state deems necessary to adequately determine the WPA;
3. Identify all potential anthropogenic (manmade) sources of contaminants within each WPA which may have any adverse effect on the health of a person;
4. A program which includes, as appropriate, technical assistance, financial assistance, implementation of control measures, education, training and demonstration projects to protect the water supply with WPAs from such contaminants;
5. Contingency plans for the location and provision of alternate drinking water supplies for each public water supply system in the event of well or wellfield contamination by such contaminants;
6. A requirement that consideration be given to all potential sources of such contaminants within each expected wellhead area of a new water well which serves a public water supply system; and
7. Includes a requirement for public participation.

The City of Pretty Prairie contracted with the Equus Beds Groundwater Management District to determine a WPA for the City's water supply wells using drawdown and zone of capture analytical methods.

PURPOSE AND SCOPE

The purpose of this report is to develop a minimum and maximum set of conditions using analytical methods to identify a well or group of wells drawdown (zone of influence) and zone of capture or (contribution) and to report the set of conditions .to the City of Pretty Prairie for use in WPA planning.

ZOI is the area surrounding a pumped well in which the water table or potentiometric surface has been changed due to groundwater withdrawal.

ZOC is the area surrounding a pumped well that includes all areas or features that supply groundwater recharge to the well.

KDHE (1995) and EPA (1987) identify and recommend six methods for use in delineating WPAs in Kansas. The methods are listed in order of increasing cost, time and complexity.

1. Arbitrary Fixed Radius
2. Calculated Fixed Radius
3. Simplified Variable Shapes
4. Analytical Methods
5. Hydrogeologic Mapping and
6. Numerical Flow-Transport Models

Detailed geologic and hydrologic information and data for the study area were obtained from Dealy (1995) and prior publications referenced in Dealy (1995). Locations and pumping rates for non domestic water wells in the study area were obtained from data bases maintained by the Equus Beds Groundwater Management District No. 2.

The City of Pretty Prairie provided well construction, pumping data and an operating plan for its three supply wells.

DESCRIPTION OF STUDY AREA

Supplementary information about the study area may be obtained from (Dealy 1995).

Location and Size

The study area encompasses a 5,000 meter by 5,000 meter area. The nine square miles area is located in the northeast portion of Township 26 South, Range 7 West and the northwest portion of Township 26 South, Range 6 West, Reno County, Kansas.

The City of Pretty Prairie is centrally located in the study area (fig. 1).

Surface Drainage

In general, the northern portion of the study area is drained by the North Fork Ninnescah River and its tributaries, hydrologic unit 11030014. The southern portion of the area, including the City of Pretty Prairie, is drained by tributaries of the South Fork Ninnescah River, hydrologic unit 11030015. The City is located at the headwaters of an unnamed tributary of the South Fork Ninnescah River. Both rivers are tributaries of the Ninnescah River and converge southeast of the study area in western Sedgwick County.

Soils

Soils in the area are classified as loams of the Farnum-Shellabarger Association. Soils in this association are nearly level to moderately sloping, brownish loamy soils over somewhat sandy or gravelly material on sloping and dissected outwashed plains. Permeability ranges from 0.2 inch per hour to five inches per hour.

Land use

Land use consists of urban, dryland and irrigated cropland in the study area. Urban use is associated with the City and is typical for a city of its size. The majority of Irrigated cropland is located north of the City. South of the City land use is predominately dryland crop with some irrigation.

Geologic Setting

Consolidated rocks of the Permian System underlying Quaternary deposits form the bedrock surface in the area of investigation. Lower Permian Series age rocks including the Stone Corral Formation and Ninnescah Shale, Sumner Group comprise bedrock surface.

Bedrock surface was formed or shaped by an erosional process. Rivers or streams eroded the surface to form channels. A channel located in the study area trends northwest to southeast.

Unconsolidated fluvial and aeolian deposits of Quaternary age overlie bedrock in the area. These undifferentiated Pleistocene deposits consist of sand and gravel interbedded with clay and silt.

The thickness of these deposits reach nearly 100 feet. The thickest deposits occur in areas associated with bedrock channels. Conversely, the thinnest deposits occur outside the channel in the northeast and southwest portions of the area.

The undifferentiated and alluvial deposits comprise the principal water-bearing material in the investigation area.

Precipitation

The average annual precipitation for Reno County is 29.05 inches. However, rainfall amounts in the area can exceed the county average by as much as seven inches.

Data indicate a correlation between rainfall and an increase in nitrate-nitrogen concentrations in groundwater in the area Dealy (1995).

Groundwater

The principal source of fresh and usable water in the area is the Equus Beds aquifer, except for water-bearing Permian rocks. The Equus Beds aquifer is part of the High Plains regional aquifer system.

Water level data indicate that the aquifer is unconfined.

Water wells completed in the Ninnescah Shale yield small quantities of water, less than 100 gallons per minute. The Stone Corral Formation is not known to yield significant amounts of water.

The slope of the water table is uniform and flat throughout the area

with a gradient of about 1.0 foot per mile. The direction of groundwater flow is northeast.

Depth to water ranges from less than twenty feet in the southern portion of the area, up to 40 feet in the northwestern portion. In and around the City, depth to water ranges from 20 feet to 25 feet.

Fluctuations in the water-table occur in response to groundwater recharge and discharge. Precipitation was the principal source of water for groundwater recharge in the study area. A shallow water-table, permeable soils and unsaturated zone occur in the area and are favorable conditions for groundwater recharge.

Principal groundwater discharges in the area were from water wells. The period of greatest discharge from water wells was May through September, primarily for irrigating crops.

The saturated thickness of the aquifer is 50 feet to 60 feet. The area of greatest thickness corresponds to the bedrock channel. Saturated thickness decreases northeast and southwest of the area.

Transmissivity and specific yield were estimated from published and unpublished reports and data on file with the Equus Beds Groundwater Management District No. 2, Halstead, Kansas.

A value of 0.15 was chosen for storage coefficient. Values for storage coefficient and specific yield are approximately the same for unconfined aquifers. Transmissivity was estimated at 50,000 gallons per day per foot

The City of Pretty Prairie obtains its water supply from three wells. Wells #3 and #4 are located in the City and well #5 is located immediately northeast of the City (fig. 1.) Each well is completed to bedrock and is authorized by a water permit issued by the Division of Water Resources.

Well #3 is in operating condition, but is not used due to high nitrate-nitrogen concentrations. The City maintains the well in operational status for fire protection. The well's pumping capacity is rated at 250 gallons per minute.

Well #4 is operational and equipped with an emergency generator. It is used as a standby well during power outages, due to high nitrate-nitrogen concentrations exceeding EPA and State maximum concentration levels (MCL). The well's pumping capacity is rated at 300 gallons per minute.

Well #5 is the City's primary water supply well and is used on a daily basis. The City estimates it operates about 3.3 hours per day to meet user demand. Presently, nitrate-nitrogen concentrations are below MCL, but above natural concentrations. The well's pumping capacity is rated at 380 gallons per minute.

The City desires to bring wells #3 and #4 on-line and operate the well field on an alternating cycle.

The present usage varies from year to year and ranges from 56,000 gallons per day (2.5 hours per day) to 335,000 gallons per day (14.7 hours per day).

Pumping by the City is small compared to the 16 large capacity irrigation wells in the study area. Authorized pumping rates range from several hundred gallons per minute up to 1,420 gallons per minute.

DELINEATION RESULTS

Graphic Analytical Models, GeoBase 7.01, utilized a series of simplified assumptions about the geologic conditions to compute the pumping affects. Assumptions utilized for the analytical methods include:

- ☐ The aquifer is uniform in thickness and nature across the study area.
- ☐ The effects of any boundary conditions will be simulated by image wells.
- ☐ The aquifer extends to infinity.
- ☐ Groundwater density and viscosity are constant.
- ☐ Groundwater flow can be described by Darcy's Law.
- ☐ Groundwater flow is horizontal and flows radially towards wells.
- ☐ The initial water table surface is horizontal.
- ☐ Specific yield is 0.15 and porosity is 0.20.
- ☐ The study area is 5,000 meters by 5,000 meters (nine square miles).
- ☐ Saturated thickness is 60 feet.
- ☐ Groundwater flow is to the northeast.
- ☐ Maximum well yield is the rate authorized by the well's water permit or the Division of Water Resources tested rate.
- ☐ A pumping period is 30 days and a three year zone of capture.

13

Drawdown Method

Drawdown is the extent to which well pumping lowers the water table of an unconfined aquifer. The area of drawdown around the well is commonly referred to as the *cone of depression* or ZOI.

The greatest drawdown occurs at the well and decreases with distance until a point is reached where the water table is not affected by the pumping. As a result of the drawdown and cone of depression being formed around the well, the hydraulic gradients or slope and groundwater flow velocities increase toward the well.

Applying the method to delineate the City's public water supply wells the drawdown boundary or ZOI was set at 0.25 foot drawdown.

Figure 2 represents the City's three wells pumping continuously at authorized rates for a period of 30 days to achieve maximum drawdown development for all three wells. Figure 3 represents all wells in the study area pumping continuously at authorized rates for a period of 30 days to achieve maximum drawdown development.

Zone of Capture

Zone of capture is the amount of aquifer in which groundwater flows to a pumped well during a specific time. The results of such an analysis can be displayed as a boundary surrounding the well that encompasses the well's groundwater recharge area.

The zone of capture may be limited or affected by physical properties of the aquifer, by other

pumping wells or by variations in the period of analysis.

Figure 4 represents a three-year zone of capture at 200 day capture intervals for the City's three wells. Other wells in the study area were assumed to be off.

Figure 5 represents a three-year zone of capture at 200 day capture intervals for the City's three wells. All wells in the study area were assumed to be on and operating to achieve maximum affect on the City's wells.

For comparison, a five-year zone of capture at 200 day capture intervals was prepared, Figure 6. All wells in the study area were assumed to be on and operating to achieve maximum affect on the City's wells.

CONSIDERATIONS

Policy and technical elements for consideration:

- ❒ The Kansas Wellhead Protection Program defines a wellhead protection are as, *the surface and subsurface area surrounding a water well or wellfield, supplying a public water system, through which contaminants area reasonably likely to move toward and reach such water well or wellfield.*
- ❒ The Kansas Wellhead Protection Program recommends that a single WPA containing more than one well is defined as one WPA when the individual WPAs coalesce and individual WPAs closely spaced may be combined into one larger WPA.
- ❒ Reaction time to provide a remedial action zone to protect well from sudden accidental or unexpected contamination releases.
- ❒ Attenuation or reduction of contaminant concentrations to desirable or authorized levels by the time they reach a well.
- ❒ The study area consists of shallow water table, loamy soils, sandy or gravely subsurface material, agronomic practices and precipitation provide favorable conditions for leachate to form.
- ❒ The use of agricultural chemicals for the production of dryland and irrigated crops was identified as the primary as the primary non-point source for nitrate-nitrogen concentrations in the study area.
- ❒ Soils permeability range from 0.2 inch per hour to five inches per hour.
- ❒ Abandoned water wells, human and animal wastes may also contribute as point sources for nitrate-nitrogen in the study area.

REFERENCES

Dealy, M.T., *Investigation of Nitrate-Nitrogen Concentrations in the Equus Beds Aquifer, Southeast Reno County, Kansas,* Equus Beds Groundwater Management District No. 2, WQI 95-01. 1995.

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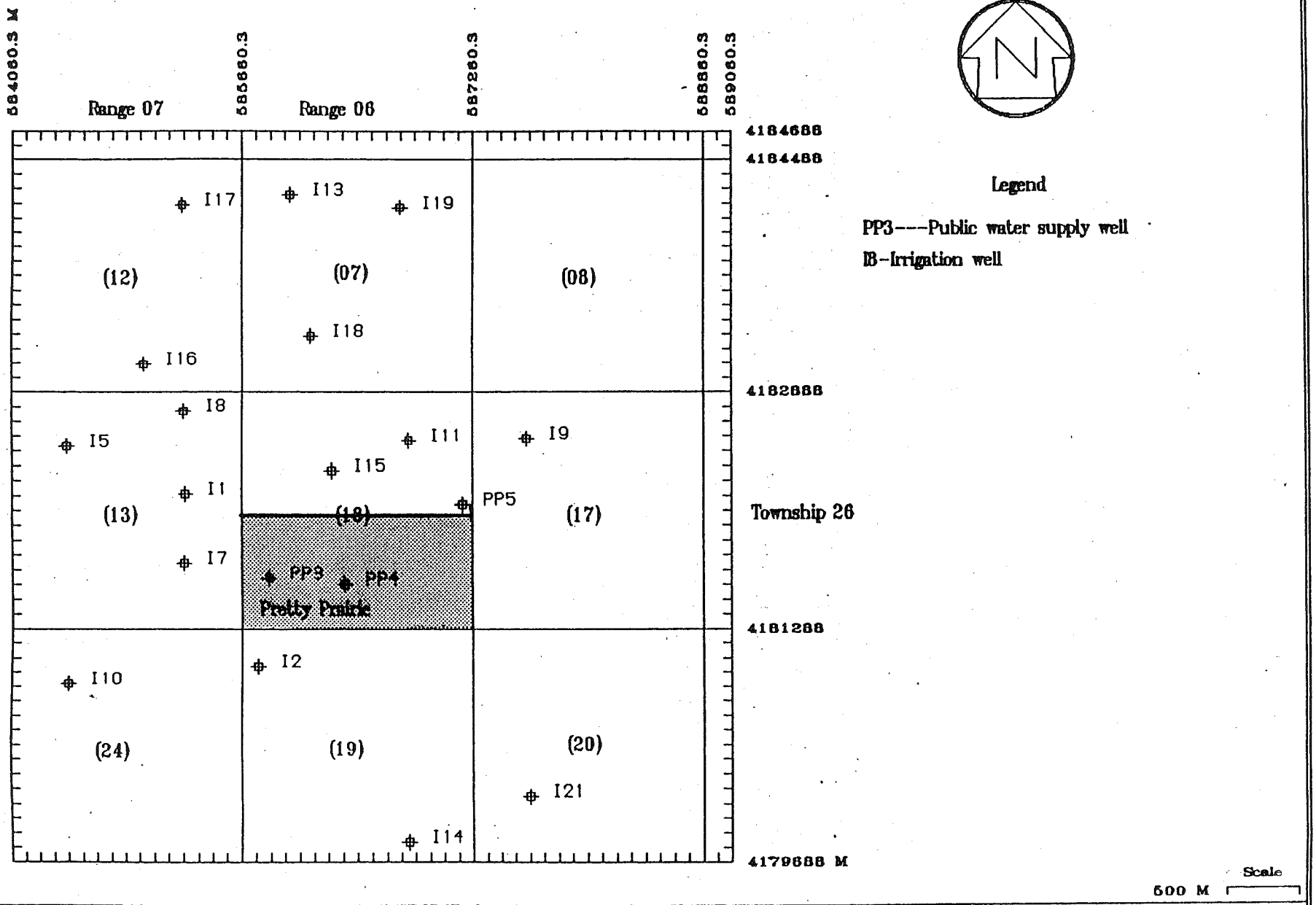
Kansas Wellhead Protection Program, Bureau of Water, Kansas Department of Health and Environment. 1996.

Hansen, C.V. *Description and Evaluation of Selected Methods Used to Delineate Wellhead-Protection Areas Around Public-Supply Wells Near Mt. Hope, Kansas*, US Geological Survey, WRIR 90-4102. 1991.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I8
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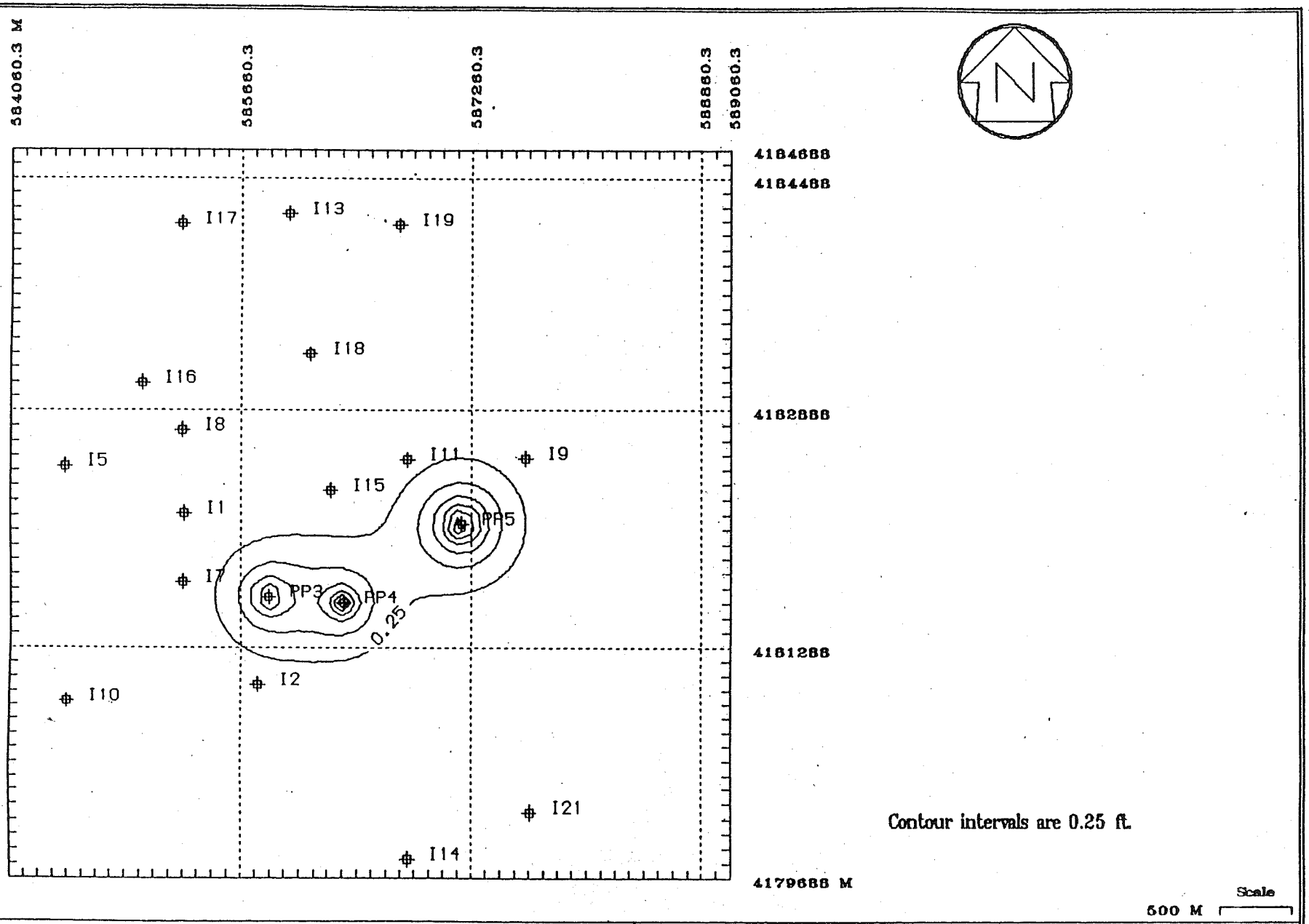
I11
I9
I15
I1
PP5
(13)
(18)
(17)
I7
PP3
PP4
Pretty Prairie
Township 26
I2
I10
(24)
(19)
(20)
I21
I14
N
Legend
PP3---Public water supply well
IB-Irrigation well
Scale
500 M
Location and Grid Map
City of Pretty Prairie, Kansas
Wellhead Protection Area Delineation
EQUUS BEDS GROUNDWATER MANAGEMENT DISTRICT
Figure : 1

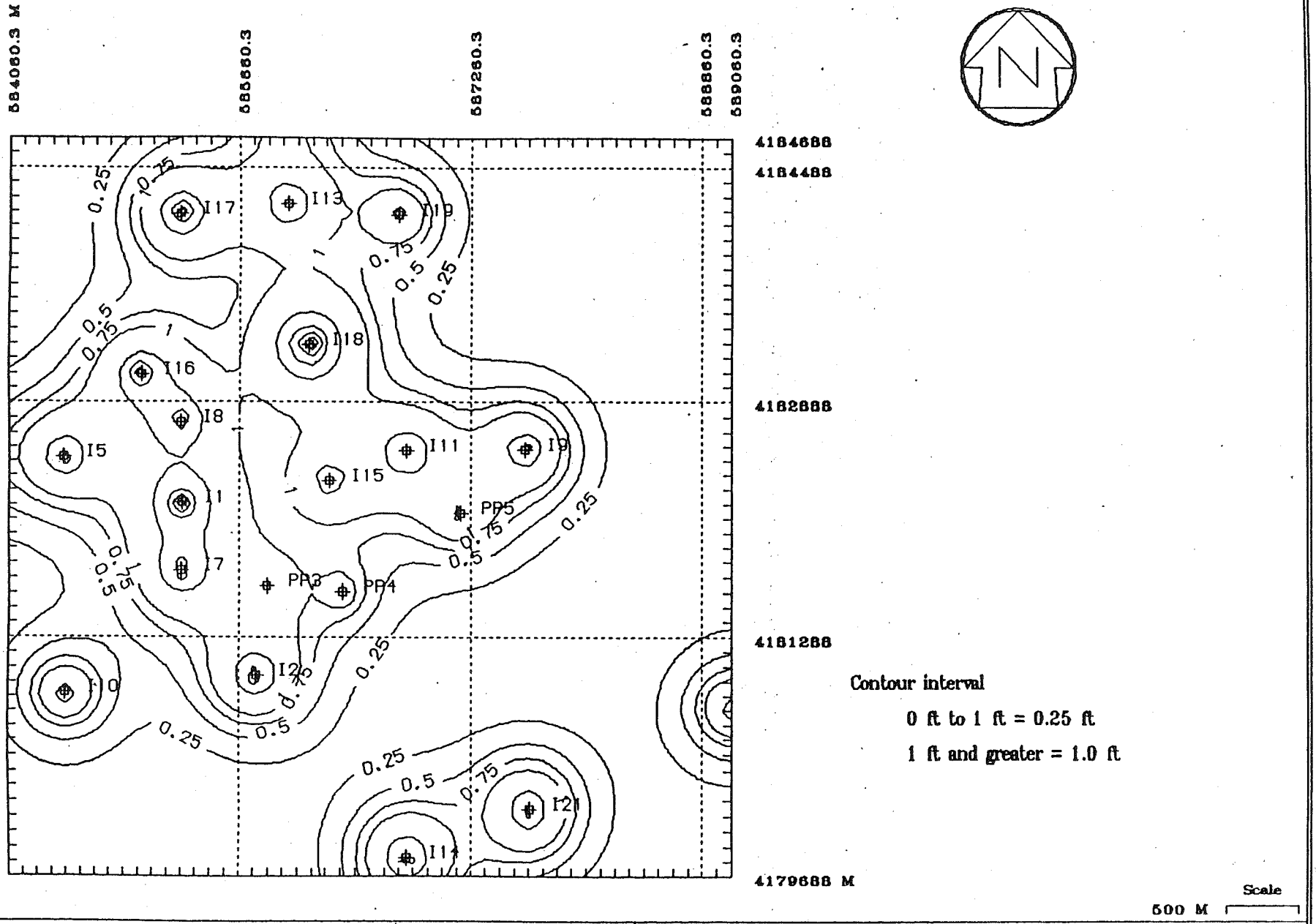


Drawdown (Zone of Influence)
City wells only

Wellhead Protection Area Delineation
Pretty Prairie, Kansas

EQUUS BEDS GROUNDWATER MANAGEMENT DISTRICT

Figure : 2

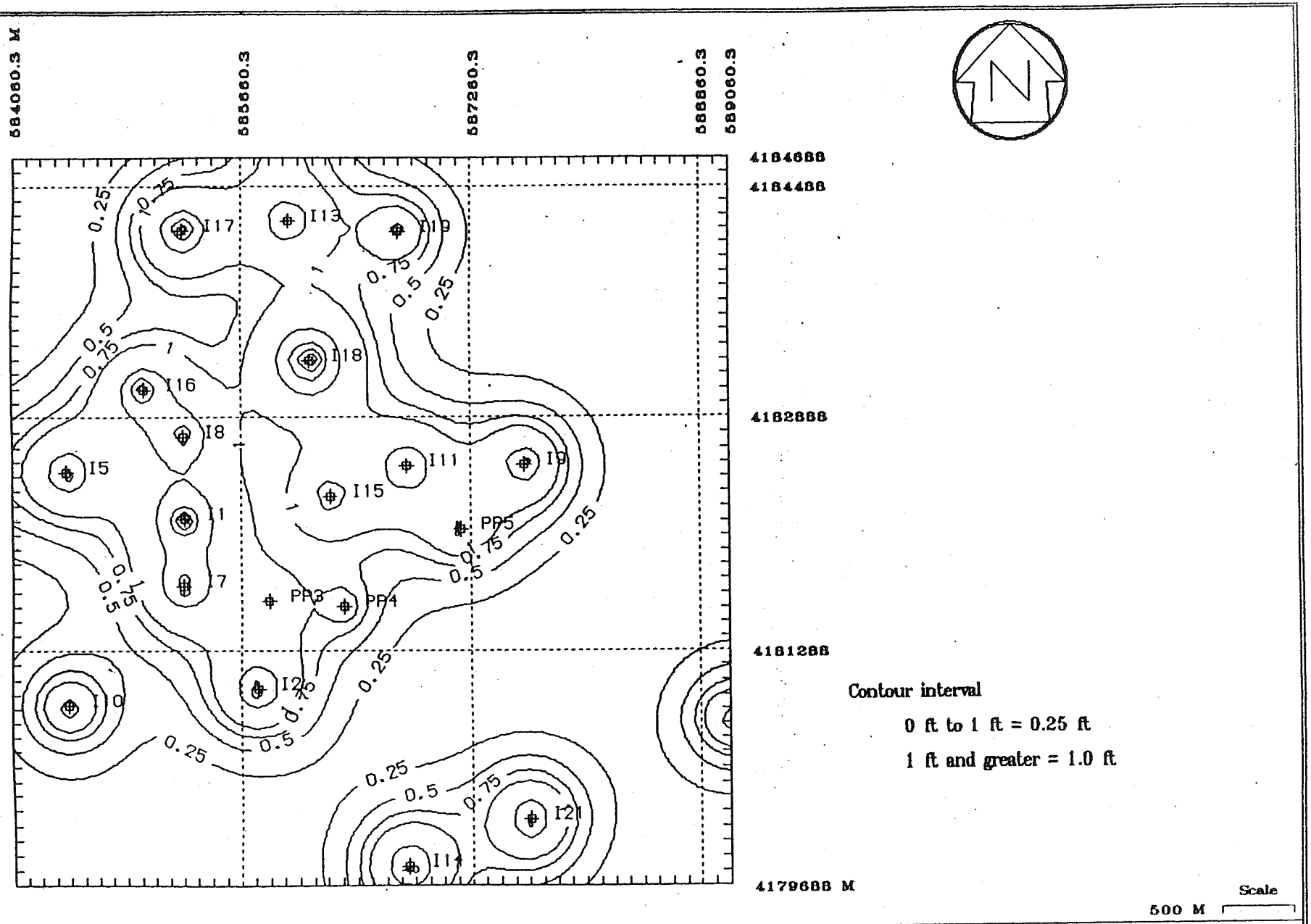


Drawdown (Zone of Influence)
All wells operating

Wellhead Protection Area Delineation
Pretty Prairie, Kansas

EQUUS BEDS GROUNDWATER MANAGEMENT DISTRICT

Figure : 3

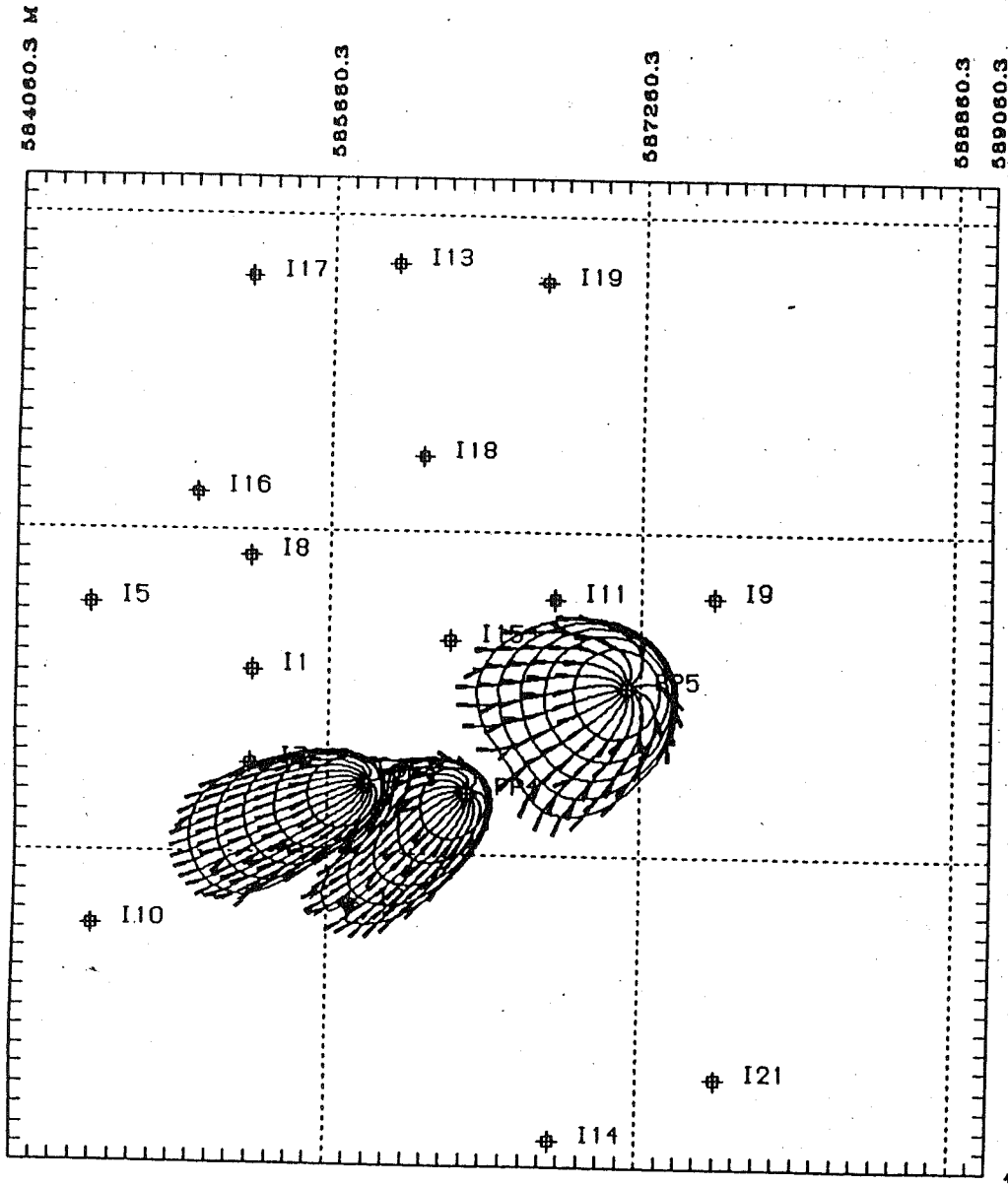


Drawdown (Zone of Influence)
All wells operating

Wellhead Protection Area Delineation
Pretty Prairie, Kansas

EQUUS BEDS GROUNDWATER MANAGEMENT DISTRICT

Figure : 3



Three year capture zone

Two hundred day capture intervals

Assumptions

Saturated thickness 60 feet

Porosity 0.20

Regional flow to northeast

Specific yield 0.15

Scale

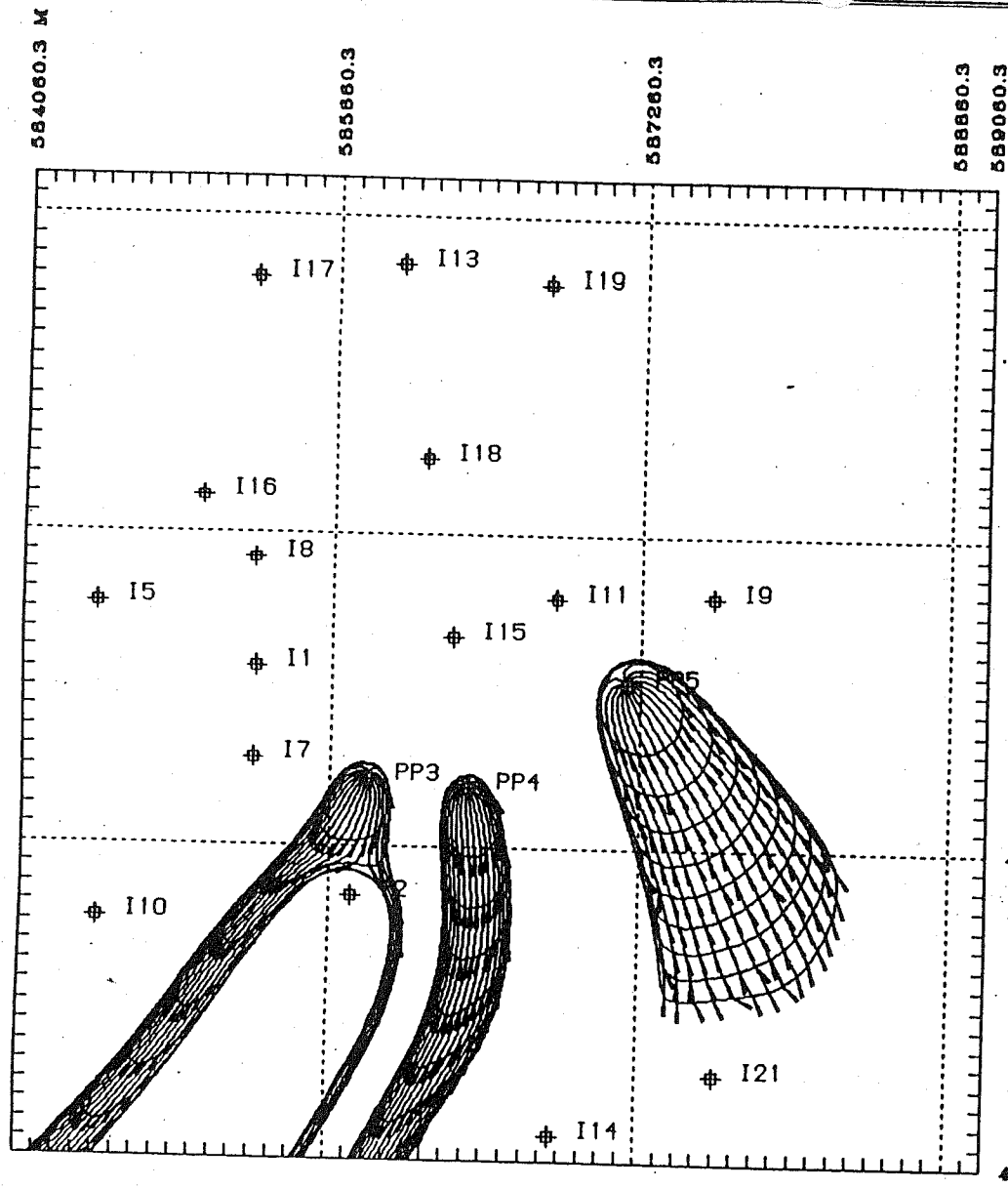
500 M

Zone of Capture and flowlines
City wells only

Wellhead Protection Area Delineation
Pretty Prairie, Kansas

EQUUS BEDS GROUNDWATER MANAGEMENT DISTRICT

Figure : 4



N

Five year capture zone

Two hundred day capture intervals

Assumptions

Saturated thickness 60 feet

Porosity 0.20

Regional flow to northeast

Specific yield 0.15

Scale

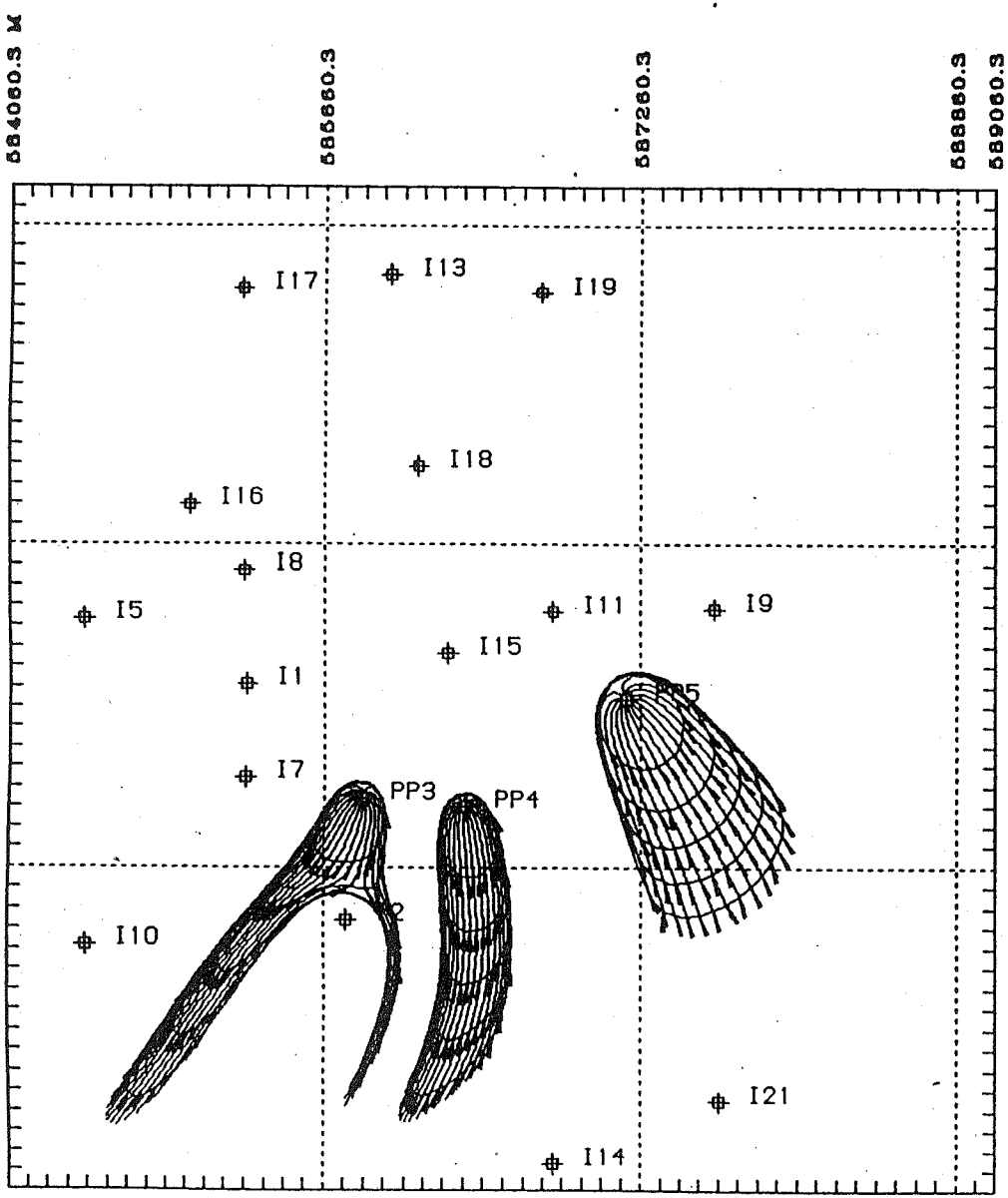
500 M

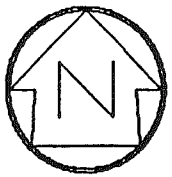
Zone of Capture and flowlines
All wells operating

Wellhead Protection Area Delineation
Pretty Prairie, Kansas

EQUUS BEDS GROUNDWATER MANAGEMENT DISTRICT

Figure : 6





Three year capture zone

Two hundred day capture intervals

Assumptions

Saturated thickness 60 feet

Porosity 0.20

Regional flow to northeast

Specific yield 0.15

Scale

500 M

Zone of Capture and flowlines
All wells operating

Wellhead Protection Area Delineation
Pretty Prairie, Kansas

EQUUS BEDS GROUNDWATER MANAGEMENT DISTRICT

Appendix - 2. Pollutant Source Inventory

Wellhead Protection Plan

Pollutant Source Inventory Check List

City of Pretty Prairie

Potential Contaminant

1-Bacteria 2-Fuel 3-Heavy Metals 4-Nitrate 5-Salts 6-Pesticides 7-Solvents

Status in Study Area

A - Past B - Present C - Future

Potential Pollutant Source	Potential Contaminant							Status In Area			Comments
(Listed by Category)	1	2	3	4	5	6	7	A	B	C	
Less Developed Rural Area											
Forest Land	x			x		x					
Wet Land	x										
Agricultural Production											
Land Cover and Crop											
Alfalfa-dryland				x		x		X			
Alfalfa-irrigated				x		x					
Barley-dryland				x		x					
Barley-irrigated				x		x					
Corn-dryland				x		x		X	X	X	
Corn-irrigated				x		x		X	X	X	
CRP								X	X	X	
Dry Beans-dryland				x		x					
Dry Beans-irrigated				x		x					
Hay (not alfalfa)				x		x		X			
Oats-dryland				x		x					
Oats-irrigated				x		x					
Orchard & Nursery											
Fruit Trees				x		x					
Trees & Shrubs				x		x					
Greenhouse				x		x	x				
Pasture (tame)	x			x		x		X	X	X	
Range	x							X	X	X	

Wellhead Protection Plan

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Status in Study Area

A - Past B - Present C - Future

Potential Pollutant Source	Potential Contaminant							Status In Area			Comments
(Listed by Category)	1	2	3	4	5	6	7	A	B	C	
Landcover and Crop (cont.)											
Rye-dryland				x		x					
Rye-irrigated				x		x					
Sorghum (milo)-dryland				x		x		X	X	X	
Sorghum (milo)-irrigated				x		x		X	X	X	
Soy Beans-dryland				x		x					
Soy Beans-irrigated				x		x		X	X	X	
Sunflowers-dryland				x		x					
Sunflowers-irrigated				x		x					
Wheat-dryland				x		x		X	X	X	
Wheat-irrigated				x		x		X	X	X	
Irrigation Well Pump Site		x	x	x	x	x	x	X	X	X	
Chemigation System				x		x		X	X	X	
Tail Water Pit	x			x		x		X	X	X	
Other-Millet				x		x		X	X	X	
Livestock											
Dairy-drylot	x			x	x	x					
Dairy-pasture	x			x	x	x		X			
Dog Kennels	x			x	x	x		X	X	X	
Cattle-feedlot	x			x	x	x		X			
Cattle-pasture	x			x	x	x		X	X	X	
Hog-feedlot	x			x	x	x		X			

Wellhead Protection Plan

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Status in Study Area

A - Past B - Present C - Future

Potential Pollutant Source	Potential Contaminant							Status In Area			Comments
(Listed by Category)	1	2	3	4	5	6	7	A	B	C	
Livestock (cont.)											
Hog-barn				x	x	x					
Horses-pasture				x	x	x					
Horses-barn				x	x	x					
Poultry-barn				x	x	x					
Sheep-pasture				x	x	x					
Temporary Livestock Confinement				x	x	x					
Other											
Farmstead											
Abandoned Water Well	x	x	x	x	x	x	x	X	X	X	
Equipment Maintenance		x	x				x	X	X	X	
Feed Mill				x		x					
Feed and Hay Storage				x				X	X	X	
Fertilizer Storage				x				X	X	X	
Fuel Storage		x					x	X	X	X	
Grain Storage				x		x	x	X	X	X	
Household Wastewater											
Septic Tank Lateral Field	x			x		x	x	X	X	X	
Lagoon	x			x		x	x				
Landscape Maintenance				x		x	x				
Livestock Confinement	x			x		x					
Pesticide Storage						x		X	X	X	

Wellhead Protection Plan

Pollutant Source Inventory Check List

City of Pretty Prairie

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Status in Study Area

A - Past B - Present C - Future

Potential Pollutant Source	Potential Contaminant							Status In Area			Comments
(Listed by Category)	1	2	3	4	5	6	7	A	B	C	
Farmstead (cont.)											
Silage				x				X			
Solid Waste Storage				x		x	x				
Water Well in Use	x							X	X	X	
Abandoned Farmstead	x	x	x	x	x	x	x				
Other											
Rural Home (nonfarmstead)											
Abandoned Water Well	x	x	x	x	x	x	x				
Animals (pets)	x			x		x		X	X	X	
Household Wastewater											
Septic Tank-Lateral Field	x			x			x	X	X	X	
Lagoon	x			x			x				
Landscape Maintenance				x		x	x				
Solid Waste Storage				x		x	x				
Water Well in Use	x							X	X	X	
Other											

Wellhead Protection Plan

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Status in Study Area

A - Past B - Present C - Future

Potential Pollutant Source	Potential Contaminant							Status In Area			Comments
(Listed by Category)	1	2	3	4	5	6	7	A	B	C	
Urban Home											
Abandoned Water Well	x	x	x	x	x	x	x	X	X	X	
Animals (pets)	x			x		x		X	X	X	
Household Wastewater											
Septic Tank-Lateral Field	x			x			x	X	X	X	
Lagoon	x			x			x				
City Sewer	x			x			x	X	X	X	
Landscape Maintenance				x		x	x				
Solid Waste Storage				x		x	x				
Water Well in Use	x							X	X	X	
Other											
Transportation & Utilities											
Rail Road	x	x	x	x	x	x	x	X			
State/Federal Highway	x	x	x	x	x	x	x				
City Streets											
Paved		x	x		x			X	X	X	
Gravel		x	x					X	X	X	
County & Township Roads											
Paved		x	x		x	x		X	X	X	
Gravel		x	x			x		X	X	X	
Electrical Substation						x					
Electrical Lines						x		X	X	X	

Wellhead Protection Plan

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A - Past B - Present C - Future

Potential Pollutant Source	Potential Contaminant							Status In Area			Comments
(Listed by Category)	1	2	3	4	5	6	7	A	B	C	
Pipelines											
Pump Station-water		x				x	x				
Pump Station-petroleum		x				x	x				
Pump Station-sewer	x			x		x	x				
Natural Gas Lines	x					x	x	X	X	X	
Petroleum Lines											
Crude					x		x				
Refined Product		x					x				
Sewer Lines	x		x	x	x		x	X	X	X	
Air Port											
Fuel Storage		x									
Pesticide Applicator						x					
Maintenance Areas		x					x				
Sanitary Wastewater	x			x							
Recreation Area											
Fair Ground	x	x		x		x		X	X	X	
City Park				x		x		X	X	X	
Camping Area											
Primitive	x			x							
Modern (wastewater collection)	x	x		x							
Golf Course		x		x		x	x	X	X	X	

Wellhead Protection Plan

Pollutant Source Inventory Check List

City of Pretty Prairie

Potential Contaminant

1-Bacteria 2-Fuel 3-Heavy Metals 4-Nitrate 5-Salts 6-Pesticides 7-Solvents

Status in Study Area

A - Past B - Present C - Future

Potential Pollutant Source	Potential Contaminant							Status In Area			Comments
(Listed by Category)	1	2	3	4	5	6	7	A	B	C	
Recreation Area (cont.)											
Gun Club		x	x	x							
Sports Complex		x		x		x					
Other											
Waste Treatment											
Wastewater											
Lagoon	x			x							
Mechanical	x			x				X	X	X	
Land Application	x			x							
Biosolids											
Storage				x				X	X	X	
Application				x							
Injection Well	x	x	x	x	x	x	x				
Other											
Solid Waste											
Sanitary Landfill	x	x	x	x	x	x	x				
Composting				x				X	X	X	
Abandoned Dump	x	x	x	x	x	x	x				
Transfer Station	x	x	x	x	x	x	x				
Other											

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A - Past B - Present C - Future

Potential Pollutant Source	Potential Contaminant							Status In Area			Comments
(Listed by Category)	1	2	3	4	5	6	7	A	B	C	
Institution											
Cemetary				x		x					
Church	x			x		x		X	X	X	
Hospital	x	x	x	x	x	x	x				
Hotel-Motel	x	x			x	x	x				
Nursing Home	x			x		x		X	X		
Prison	x	x	x	x	x	x	x				
Restaurant	x	x		x		x	x	X	X	X	
School	x			x		x	x	X	X	X	
Other											
Commercial Activities											
Agricultural Service Center											
Onsite Wastewater	x			x							
Water Well in Use	x	x			x	x	x	X	X	X	
Fuel Sales		x					x	X	X	X	
Equipment Repair		x	x				x	X	X	X	
Fertilizer Sales				x				X	X	X	
Fertilizer Application Service				x				X	X	X	
Pesticide Sales						x		X	X	X	
Pesticide Application Service						x		X	X	X	
Feed Mill				x		x		X	X	X	
Grain Elevator				x		x	x	X	X	X	

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Status in Study Area

A - Past B - Present C - Future

Potential Pollutant Source	Potential Contaminant							Status In Area			Comments
(Listed by Category)	1	2	3	4	5	6	7	A	B	C	
Farm Equip. Sales and Service											
Onsite Wastewater	x			x				X			
Water Well in Use	x										
Fuel Storage & Sales		x					x	X			
Agricultural Services											
Custom Packing Plant	x			x				X			
Sale Barn	x			x				X			
Seed Processor				x		x					
Truck Wash	x	x	x	x	x	x	x				
Veterinary Clinic	x			x		x	x	X			
Small Business											
Auto Repair Shop		x	x				x	X	X	X	
Beauty Shop							x	X	X	X	
Car Wash	x	x	x	x	x	x	x	X	X	X	
Dry Cleaner							x	X			
Fuel Service Station		x	x				x	X	X	X	
Funeral Home	x						x	X			
Hardware Store		x	x	x	x	x	x	X	X	X	
Photography/Print Shop			x				x	X			
Small Engine Repair		x	x				x	X	X	X	
Welding Shop		x	x				x	X	X	X	

Wellhead Protection Plan

Pollutant Source Inventory Check List

City of Pretty Prairie

Potential Contaminant

1-Bacteria 2-Fuel 3-Heavy Metals 4-Nitrate 5-Salts 6-Pesticides 7-Solvents

Status in Study Area

A - Past B - Present C - Future

Potential Pollutant Source (Listed by Category)	Potential Contaminant							Status In Area			Comments
	1	2	3	4	5	6	7	A	B	C	
Industrial Sites											
Food Processor		x		x	x		x				
Pharmaceutical Plant	x	x	x	x	x		x				
Meat Processor	x	x		x	x		x				
Metal Fabrication		x	x				x	X	X	X	
Metal Plater		x	x		x		x				
On-site sanitary wastewater	x			x							
Petro-chemical Refinery		x	x	x	x	x	x				
Research Laboratory	x	x	x	x	x	x	x				
Salvage - Recycler		x	x		x	x	x				
Water Well in Use	x										
Mineral Extraction											
Coal Mine		x	x				x				
Oil or Gas Well		x	x		x		x				
Rock Quarry		x				x					
Geophysical Exploration Test Holes	x			x		x		X	X	X	
On-site Sanitary Wastewater	x			x							
Water Well in Use	x										
Other											
*											
*											
*											
*											
*											

Appendix - 3. Susceptibility Analysis And Recommended Water Quality Protection Measures

Using the Pollutant Source Inventory Checklist and the Committee's general knowledge of the area and land uses/activities, the risk each potential pollutant source category may pose was evaluated. (If the committee was not familiar with a particular type of pollutant source and it's potential contaminants, they first educated themselves about that source.) The pollutant source category with the highest risk was listed first, the second highest second, ...etc. Risk was determined using the following criteria:

1. Distance to well/intake
2. Natural protection
3. Water Quality Protection Measures used (or not used)
4. Toxicity of contaminants
5. Concentration of contaminants
6. Amounts of contaminants

The following assumptions were made when evaluating these factors:

1. Shorter distance = higher risk
2. Lower level of natural protection = higher risk
3. Less attention to water quality protection = higher risk
4. Higher toxicity = higher risk
5. Higher concentration = higher risk
6. Higher amount = higher risk

The following Susceptibility Evaluation Table was used to determine the risk posed by the potential pollutant sources.

	Level of Risk				
Criteria	Low		Medium		High
Distance to well/intake	1	2	3	4	5
Natural protection	1	2	3	4	5
Application of Water Quality Protection Measures	1	2	3	4	5
Toxicity of contaminant(s)	1	2	3	4	5
Concentration of contaminant(s)	1	2	3	4	5
Amount of contaminant(s)	1	2	3	4	5

Total _____ Scale 6-10 Low 11-19 Medium 20-30 High

Recommended Water Quality Protection Measures

City of Pretty Prairie, Kansas

Pollutant Source	Distance to Well/ Intake	Natural Protection	Appl. of WQMP	Potential Health Impact	Conc. of Contam.	Amount of Contam.	Total	Protection Measure
Abandoned Water Well	3	5	3	3	3	3	20	Identify and properly plug all abandoned wells through a coordinated effort with landowners, cost share programs such as the County Conservation District Non-Point Source Program and the Public Water Supply.
Chemigation System	3	4	1	3	4	4	19	Follow applicable State and Federal laws and regulations concerning proper operation and maintenance of Chemigation Systems. In particular, attention should be give to proper operation of anti-pollution devices.
Tail Water Pit	3	5	1	3	2	2	16	Construct and maintain according to State and Federal laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices for Cropland Production-Nutrient Management and Pesticide Application.
Ag. Center Fuel Sales	2	3	1	3	3	4	16	Visually monitor above ground tanks for leaks. Comply with Kansas Department of Health & Environment regulations for bulk fuel storage tanks.
Fuel Service Station	2	3	1	3	3	4	16	Visually monitor above ground tanks for leaks. Comply with Kansas Department of Health & Environment regulations for bulk fuel storage tanks.
Ag. Center Pesticide Sales	2	3	1	3	3	4	16	Store all pesticides according to State and Federal laws and regulations. Handle pesticides in such a manner that it is not allowed to enter the soil at the storage site. Follow label directions.
Sewer Lines	3	3	1	3	3	3	16	Smoke test sewer system to locate leaks. Maintain pipelines in good condition.
Ag. Center Fertilizer Sales	2	3	1	3	3	4	16	Store bulk fertilizer according to State and Federal laws and regulations. Handle fertilizer

Recommended Water Quality Protection Measures
City of Pretty Prairie, Kansas

Pollutant Source	Distance to Well/ Intake	Natural Protection	Appl. of WQMP	Potential Health Impact	Conc. of Contam.	Amount of Contam.	Total	Protection Measure
								in such a manner that it is not allowed to enter the soil at the storage site.
County & Township Roads (gravel)	4	3	1	2	2	2	14	Use good practices for use and handling of de-icers, pesticides, and road construction materials. Use good erosion control practices.
Wastewater: Mechanical	1	3	1	3	3	3	14	Operate and maintain according to applicable State and Federal laws and regulations.
Hog-feedlot (past)	3	3	1	3	2	2	14	Operate and maintain according to applicable State and Federal waste management laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application.
Farmstead Fuel Storage	3	3	1	3	3	1	14	Visually monitor above ground tanks for leaks. Comply with applicable State and Federal laws and regulations for large above-ground and underground storage tanks.
Land Cover & Crop (Irrigated)	4	3	1	3	1	1	13	Follow Kansas Catalog of NPS Pollution Control Practices for Cropland Production - Nutrient Management and Pesticide Application. Use only the amount of water the crop needs.
Irrigation Well Pump Site	3	4	1	3	1	1	13	Maintain site in such away that no fuels or other contaminants may enter the soil. When possible, maintain a vegetative buffer strip between the well site and crop.
Farm Equip. Dealer Fuel Storage & Sales (past)	2	3	1	2	2	3	13	Visually monitor above ground tanks for leaks. Comply with State and Federal laws and regulations concerning bulk storage of fuels in above ground and underground storage tanks.
Sale Barn (past)	2	3	1	3	2	2	13	Operate and maintain according to applicable State and Federal waste management laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices- Waste Management

Recommended Water Quality Protection Measures

City of Pretty Prairie, Kansas

Pollutant Source	Distance to Well/ Intake	Natural Protection	Appl. of WQMP	Potential Health Impact	Conc. of Contam.	Amount of Contam.	Total	Protection Measure
								and Pesticide Application.
Household Wastewater (Septic Tank, Lateral Field)	3	3	1	3	2	1	13	Install and maintain septic system according to Kansas Department of Health and Environment regulations and local codes.
Cattle-feedlot (past)	2	3	1	3	2	2	13	Operate and maintain according to applicable State and Federal waste management laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application.
City Streets-Paved	3	3	1	2	2	2	13	Use good practices for use and handling of de-icers, pesticides, and road construction materials. Use good erosion control practices.
Household Wastewater-Lines to City Sewer	3	3	1	3	2	1	13	Install and maintain lines according to Kansas Department of Health and Environment regulations and local codes.
Ag. Center Pesticide Application Service	2	3	1	3	2	2	13	Follow Kansas Catalog of NPS Control Practices for Proper Pesticide Storage, Handling and Mixing. Handle pesticides in such a manner that it is not allowed to enter the soil. Follow label directions.
Ag. Center Grain Elevator	2	3	1	3	2	2	13	Avoid long term storage or spillage of grain on the ground. Use care when using pesticides to prevent them from enter the soil.
County & Township Roads (paved)	3	3	1	2	2	2	13	Use good practices for use and handling of de-icers, pesticides, and road construction materials. Use good erosion control practices.
Ag. Center Fertilizer Application Service	2	3	1	3	2	2	13	Conduct soil test before application of fertilizer. Apply fertilizer according to crop nutrient requirements. Follow Kansas Catalog of NPS Pollution Control Practices for Cropland Production-Nutrient Management and Pesticide Application.
Farmstead Fertilizer	1	3	1	3	3	1	12	Store fertilizer in such a manner that any

Recommended Water Quality Protection Measures
City of Pretty Prairie, Kansas

Pollutant Source	Distance to Well/ Intake	Natural Protection	Appl. of WQMP	Potential Health Impact	Conc. of Contam.	Amount of Contam.	Total	Protection Measure
Storage								spills are contained and prevented from entering the soil.
City Streets-gravel	2	3	1	2	2	2	12	Use good practices for use and handling of de-icers, pesticides, and road construction materials. Use good erosion control practices.
Farmstead Pesticide Storage	2	3	1	3	2	1	12	Follow Kansas Catalog of NPS Pollution Control Practices for Proper Pesticide Storage, Handling and Mixing. Read and follow product labels.
Farmstead Grain Storage	3	3	1	3	1	1	12	Avoid long term spillage or storage of grain on the ground. Use care when using pesticides to prevent them from entering the soil.
Railroad Tracks (past)	2	3	1	2	2	2	12	Maintain railroad tracks in good condition. Contact the Kansas Department of Health and Environment immediately in the event of an accidental spill or derailment.
Farmstead Equipment Maintenance	3	3	1	3	1	1	12	Use good practices for handling, recycling and disposal of equipment parts and fluids, so no contaminants may enter the soil.
Land Cover & Crop (Dryland)	3	3	1	3	1	1	12	Follow Kansas Catalog of NPS Pollution Control Practices for Cropland Production - Nutrient Management and Pesticide Application.
Auto Repair Shop	2	3	1	3	1	1	11	Use good practices for handling, recycling and disposal of equipment parts, fuels, and solvents. Prevent contaminants from entering the soil.
Nursing Home	2	3	1	3	1	1	11	Properly dispose of biological and chemical wastes in accordance with State and Federal laws and regulations. Limit use of fertilizer and pesticides on lawns.
Ag. Center Equipment Repair	2	3	1	3	1	1	11	Use good practices for handling, recycling and disposal of equipment parts and fluids, so no contaminants may enter the soil.
Dog Kennel	2	3	1	3	1	1	11	Operate and maintain according to applicable

Recommended Water Quality Protection Measures
City of Pretty Prairie, Kansas

Pollutant Source	Distance to Well/ Intake	Natural Protection	Appl. of WQMP	Potential Health Impact	Conc. of Contam.	Amount of Contam.	Total	Protection Measure
								State and Federal waste management laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application.
Dry Cleaner (past)	2	3	1	3	1	1	11	Prevent solvents and spotting chemicals from entering the soil.
Veterinary Clinic (past)	2	3	1	3	1	1	11	Dispose of all biological and chemical waste in accordance to State and Federal laws and regulations and local codes.
Wastewater: Biosolids Storage	1	3	1	2	2	2	11	Operate and maintain according to applicable State and Federal laws and regulations.
Ag. Center Feed Mill	2	3	1	2	1	1	10	Avoid long term spillage of feed on the ground. Use care when using pesticides to prevent them from entering the soil.
Ag. Center Water well in use	2	3	1	2	1	1	10	Properly protect and maintain the well and wellhead according to Kansas Department of Health & Environment standards and recommendations.
Custom Packing Plant (past)	2	3	1	2	1	1	10	Dispose of all waste according to State and Federal laws and regulations.
Metal Fabrication	2	3	1	2	1	1	10	Dispose of all waste according to State and Federal laws and regulations.
Photography/Print Shop (past)	2	3	1	2	1	1	10	Prevent solvents and processing chemicals from entering the soil.
Cattle-pasture	1	3	1	3	1	1	10	Operate and maintain according to applicable State and Federal waste management laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application.
Welding Shop	2	3	1	2	1	1	10	Use good practices for use, handling, recycling, and disposal of solid wastes, fuels, and solvents. Prevent contaminants from entering the soil.

Recommended Water Quality Protection Measures

City of Pretty Prairie, Kansas

Pollutant Source	Distance to Well/ Intake	Natural Protection	Appl. of WQMP	Potential Health Impact	Conc. of Contam.	Amount of Contam.	Total	Protection Measure
Beauty Shop	2	3	1	2	1	1	10	Prevent perm solutions or dyes from entering the soil.
Car Wash	2	3	1	2	1	1	10	Dispose of wash water according to State and Federal laws and regulations and local codes.
Farm Equip. Dealer On-Site Wastewater (past)	2	3	1	2	1	1	10	Install and maintain onsite wastewater system according to Kansas Department of Health and Environment laws and regulations and local codes.
Golf Course	1	3	1	3	1	1	10	Follow Kansas Catalog of NPS Pollution Control Practices for Cropland Production- Nutrient Management and Pesticide Application.
Hardware Store	2	3	1	2	1	1	10	Prevent paints, solvents, fuels, and other contaminants from entering the soil.
Small Engine Repair	2	3	1	2	1	1	10	Use good practices for handling, recycling and disposal of equipment parts, fuel and solvents. Prevent contaminants from entering the soil.
Funeral Home (past)	2	3	1	2	1	1	10	Prevent biological and chemical materials from entering the soil.
Farmstead Feed and Hay Storage	3	3	1	1	1	1	10	When possible, avoid storage of feed or hay on the ground. When storing on the ground, protect from rain and/or store at different sites each year. Use care when using pesticides to prevent them from entering the soil.
Water Well in Use	3	3	1	1	1	1	10	Properly protect and maintain the well and wellhead according to Kansas Dept. of Health & Environment standards and recommendations
Farmstead Silage (past)	1	3	1	2	1	1	9	Protect from rain and runoff. In areas with shallow aquifers avoid storage in unlined ground storage bunkers.
City Park	2	3	1	1	1	1	9	Maintain park in such a manner that all wastes are disposed of properly. Limit use of fetilizers and pesticides when possible.
Restaurant	2	3	1	1	1	1	9	Limit use of fertilizer and pesticides on lawns.

Recommended Water Quality Protection Measures
City of Pretty Prairie, Kansas

Pollutant Source	Distance to Well/ Intake	Natural Protection	Appl. of WQMP	Potential Health Impact	Conc. of Contam.	Amount of Contam.	Total	Protection Measure
								Dispose of waste according to State laws and regulations and local codes.
Fair Ground	2	3	1	1	1	1	9	Maintain grounds in such a manner that all wastes are disposed of properly. Limit use of fertilizers and pesticides when possible.
School	2	3	1	1	1	1	9	Limit use of fertilizer and pesticides on lawns. Dispose of waste according to State laws and regulations and local codes.
Animals (pets)	2	3	1	1	1	1	9	Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application. Clean out confinement area regularly.
Church	2	3	1	1	1	1	9	Limit use of fertilizer and pesticides on lawn. Dispose of waste according to State laws and regulations and local codes
Natural gas	2	3	1	1	1	1	9	Periodically inspect pipelines for leaks. Follow Kansas Catalog of NPS Control Practices for application of weed control pesticides.
Dairy-pasture (past)	1	3	1	2	1	1	9	Operate and maintain according to applicable State and Federal waste management laws and regulations. Follow Kansas Catalog of NPS Pollution Control Practices-Waste Management and Pesticide Application.
Composting	1	3	1	2	1	1	9	Operate and maintain according to applicable State and Federal laws and regulations.
Geophysical Exploration Test Holes (monitoring wells)	2	3	1	1	1	1	9	Properly plug all test holes when activities are completed.
Electrical Lines	1	3	1	1	1	1	8	Use good practices for herbicide application and brush control. Follow Kansas Catalog of NPS Pollution Control Practices for proper pesticide handling and mixing.
Pasture (Tame & Range)	1	3	1	1	1	1	8	Follow Kansas Catalog of NPS Pollution Control

Recommended Water Quality Protection Measures

City of Pretty Prairie, Kansas

Pollutant Source	Distance to Well/ Intake	Natural Protection	Appl. of WQMP	Potential Health Impact	Conc. of Contam.	Amount of Contam.	Total	Protection Measure
CRP	1	3	1	1	1	1	8	Practices for Cropland Production - Nutrient Management and Pesticide Application When possible leave in undisturbed state. Maintain according to State and Federal laws and regulations concerning CRP lands.

Appendix - 4. Decision on Rigorous Delineation:

The City of Pretty Prairie decided that after evaluating the results of the Susceptibility Analysis that-

_____ The preliminary delineation was satisfactory to their needs. They do not intend to legally restrict or prohibit activities within the protection area(s), but rather choose to influence activities through non-regulatory activities.

__X__ A preliminary delineation using a three and five year time of travel was satisfactory to their needs. They do not intend to legally restrict or prohibit activities within the protection area(s), but rather choose to influence activities through non-regulatory activities.

_____ The preliminary delineation did not meet their needs. The risks posed by the activities and land uses within the preliminary protection area were sufficiently high, so as to dictate the need to restrict or prohibit certain activities.

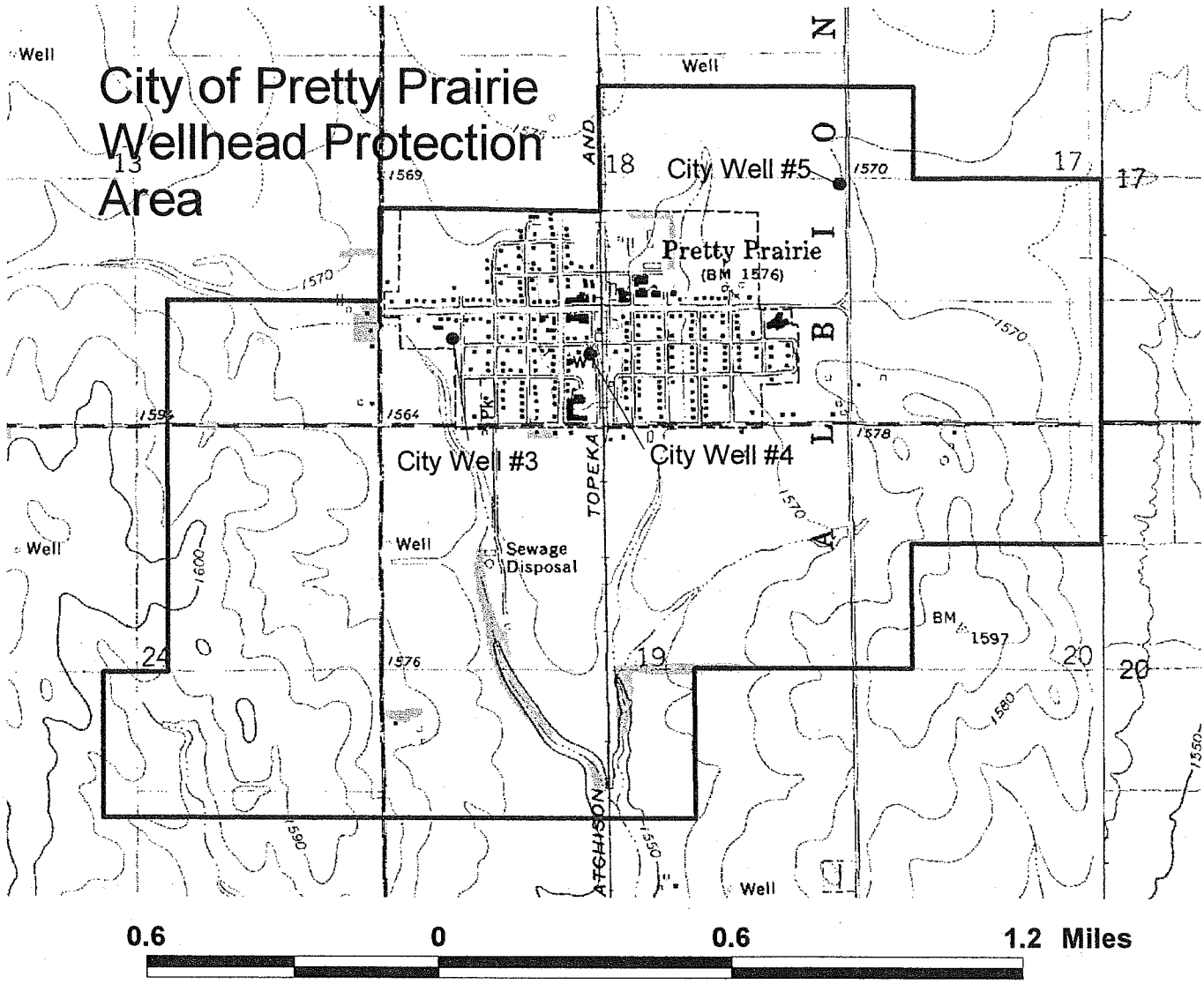
Appendix - 5. Public Participation:

The City of Pretty Prairie solicited public participation while developing it's Source Water Protection Plan in the following manner:

The City of Pretty Prairie solicited public participation by asking farmers and local citizens to participate on a Wellhead Protection Committee. Before the final Source Water (Wellhead) Protection Plan is submitted to KDHE for approval, a notice for public review and comment will be posted at the City Hall and the local newspaper. A public comment meeting will be held (as a part of a city council meeting) in the hope that any questions or suggestions can be answered and considered before the final draft is approved and submitted to the Kansas Department of Health and Environment.

Appendix - 6. Review and Approval document from the Kansas Department of Health and Environment

City of Pretty Prairie



Delineation of Protection Area based on 3-year Capture Zone

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Whp bound for pp.shp
City wells.shp